

Idaho National Engineering & Environmental Laboratory  
Bechtel BWXT Idaho LLC.

## HANDHELD ULTRASONIC THICKNESS GAUGE

### Summary:

The Handheld Ultrasonic Thickness Gauge was deployed as part of the HF cylinder removal project at INTEC. The gauge assisted project personnel in determining the condition of the HF cylinders prior to lifting or transporting. Deployment of the gauge reduced worker risk by allowing the workers to test the integrity of the compressed gas cylinder without performing a static pressure test in the field and met the DOT container integrity requirements for transport.

The gauge employs an ultrasonic sound wave to determine wall thickness to within 1/1000<sup>th</sup> inch. The cost to utilize the gauge was minimal at \$2,000. The cost to plan schedule and implement a static pressure test at a remote site on a suspect cylinder containing toxic material and an explosive gas was conservatively estimated at \$23,000.

The cost savings is estimated at  $(\$23,000 - \$2,000) = \$21,000$

This deployment does not address a technology need.

### Qualitative Benefit Analysis

Programmatic Risk	● Risk to the ER program was reduced via the use of the Handheld Ultrasonic Thickness Gauge during the HF cylinder removal project.
Technical Adequacy	● The Handheld Ultrasonic Thickness Gauge allowed the removal of the cylinders to proceed faster than without the gauge. Assuming that an explosive hazard had existed would have warranted additional planning.
Safety	● The Handheld Ultrasonic Thickness Gauge allowed for the safe removal of Hydrogen Fluoride cylinders. Worker risk was greatly reduced since the gauge enabled them to validate container integrity and reduce the potential of a release of toxic material and explosive prior to handling the compressed gas cylinders.
Schedule Impact	● Using the Handheld Ultrasonic Thickness Gauge, on-site cylinder integrity determination was possible. If the removal task had to be performed remotely, delays would have occurred.

<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>
Major Improvement	Some Improvement	No Change	Somewhat Worse	Major Decline

Quantitative Benefit Analysis	
Cost Impact Analysis	Cost avoidance was achieved by not having to plan for and implement a remotely affected tank removal.
	Annual Savings \$21,000
	Life Cycle Cost Savings \$21,000
	Return-On-Investment (ROI) 1050%

**Worksheet 1: Operating & Maintenance Annual Recurring Costs**

Expense Cost Items *	Before (B) Annual Costs	After (A) Annual Costs
1. Equipment	\$ -	\$ -
2. Purchased Raw Materials and Supplies	\$ -	\$ -
3. Process Operation Costs:		
Utility Costs	\$ -	\$ -
Labor Costs	\$ 23,000.00	\$ -
Routine Maintenance Costs for Processes	\$ -	\$ -
Subtotal	\$ 23,000.00	\$ -
4. PPE and Related Health/Safety/Supply Costs	\$ -	\$ -
5. Waste Management Costs:		
Waste Container Costs	\$ -	\$ -
Treatment/Storage/Disposal Costs	\$ -	\$ -
Inspection/Compliance Costs	\$ -	\$ -
Subtotal	\$ -	\$ -
6. Recycling Costs		
Material Collection/Separation/Preparation Costs:		
a) Material and Supply Costs	\$ -	\$ -
b) Operations and Maintenance Labor Costs	\$ -	\$ -
Vendor Costs for Recycling	\$ -	\$ -
Subtotal	\$ -	\$ -
7. Administrative/other Costs (planner)	\$ -	\$ -
<b>Total Annual Cost:</b>	<b>\$ 23,000.00</b>	<b>\$ -</b>

\* See attached Supporting Data and Calculations.

**Worksheet 2: Itemized Project Funding Requirements\***  
**(i.e., One Time Implementation Costs)**

Category	Cost \$
<b>INITIAL CAPITAL INVESTMENT</b>	
1. Design	\$ -
2. Purchase	\$ 2,000
3. Installation	\$ -
4. Other Capital Investment (explain)	\$ -
<b>Subtotal: Capital Investment= (C)</b>	\$ 2,000
<b>INSTALLATION OPERATING EXPENSES</b>	
1. Planning/Procedure Development	\$ -
2. Training	\$ -
3. Miscellaneous Supplies	\$ -
4. Startup/testing	\$ -
5. Readiness Reviews/Management Assessment/Administrative Costs	\$ -
6. Other Installation Operating Expenses (explain)	\$ -
<b>Subtotal: Installation Operating Expense = (E)</b>	\$ -
7. All company adders (G & A/PHMC Fee, MPR, GFS, Overhead, taxes, etc.)(if not contained in above items)	\$ -
<b>Total Project Funding Requirements=(C + E)</b>	\$ 2,000
Useful Project Life = (L) 1 Years Time to Implement: 0 Months	
<b>Estimated Project Termination/Disassembly Cost (if applicable) = (D)</b>	\$ -
(Only for Projects where L<5 years; D=0 if L>5 years)	
<b>TOTAL LIFE-CYCLE COST SAVINGS CALCULATION FOR IPABS-IS</b>	
<i>(Before - After) x (Useful Life) - (Total Project Funding Requirements + Termination)</i>	
Total Life Cycle Cost Savings Estimate = (B - A) x L - (C+E+D)	\$21,000
<b>RETURN ON INVESTMENT CALCULATION</b>	
Return on Investment (ROI) % =	
$\frac{(Before - After) - [(Total Project Funding Requirements + Termination)/Useful Life]}{[Total Project Funding Requirements + Project Termination]} \times 100$	
$ROI = \frac{B-A-[(C+E+D)/L]}{(C+E+D)} \times 100 = 1050 \%$	
O&M Annual Recurring Costs:	Project Funding Requirements:
Annual Costs, Before= \$ 23,000 (B)	Capital Investment= \$ 2,000 (C)
Annual Costs, After= \$ - (A)	Installation Op. Exp= \$ - (E)
Net Annual Savings= \$ 23,000 (B-A)	Total Project Funds= \$ 2,000 (C+E)
Note: Before (B) and After (A) are Operating & Maintenance Annual Recurring Costs from Worksheet 1.	

### Basis for Estimates

1	Equipment

2	Purchased Raw Materials and Supplies

3	Process Operation Costs:
	<p><b>Utility Costs</b></p> <p><b>Labor Costs</b>                      The cost to plan schedule and implement a static pressure test at a remote site on a suspect cylinder containing toxic material and an explosive gas was conservatively estimated at \$23,000.</p> <p><b>Routine Maintenance Costs for Processes</b></p>

	Summary
	<p>The alternative to using this technology was to conduct a static pressure test. The cost to utilize the thickness gauge was minimal at \$2,000. If this is deducted from the \$23,000 estimated for the alternative method there is a cost savings to the project of \$21,000.</p>

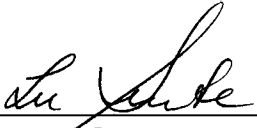
## SCIENCE AND TECHNOLOGY BENEFIT ANALYSIS DEPLOYMENT APPROVALS

**Technology Deployed:** HANDHELD ULTRASONIC THICKNESS GAUGE

**Date Deployed:** 12/01/00

**EM Program(s) Impacted:** Environmental Restoration Program

### Approval Signatures

  
\_\_\_\_\_  
Contractor Program Manager 8/21/01  
Date

N/A  
\_\_\_\_\_  
Contractor Program Manager Date

Kathleen E Hair  
\_\_\_\_\_  
DOE-ID Program Manager 8/23/01  
Date

N/A  
\_\_\_\_\_  
DOE-ID Program Manager Date